

# Design of a virtual reality platform for studying immersion and behaviours in aggressive crowds

Offer type: **PhD**

Location: **Rennes (France)**

Research Topic: **Perception, cognition, interaction**

Project: **ANR OPMOPS**

Teams: **LAGADIC / MIMETIC**

Supervisors: **L. Hoyet, A.-H. Olivier, J. Pettré**



## Mission

### Context

The general context of this PhD topic is crowd simulation. The general objective of crowd simulation is to reproduce, understand and predict the behaviours of real crowds. In this PhD, we are interested in a specific type of human crowds, with high potential for conflicts and crowd members exhibiting aggressive behaviors.

There is a general lack of knowledge about crowd behaviors because of the complexity of studying them in ecological situations, in particular in the case aggressive crowds. However, virtual reality has demonstrated its potential to study such crowd behaviors. For example, the technology was used to study interactions in crowds between individuals and moving groups of people [Bruneau et al. 2015]. With a similar approach, the objective of this thesis is to create a virtual reality platform to study behaviors in the situation of aggressive crowds.

The research context for this thesis is the franco-german ANR project OPMOPS, which gathers experts in mathematics, physics and computer science, as well as public authorities in charge of mass events. Inria, partner of this project, will deliver virtual reality tools to study aggressive crowd scenarios. The research activities will be supported by a research engineer also recruited on the same project.

### Objectives

In this thesis, the research activities will be articulated around 3 main objectives.

- 1) Create an immersive environment exhibiting aggressive behaviors. This first requires the development of the virtual environment (character animation, 3D world, events). This also requires to evaluate the realism of the achieved content through user studies, as detailed in [Olivier et al. 2014, Olivier et al. 2017]
- 2) Second, we will explore new modalities for the rendering of crowds. In addition to graphical rendering, we are interested in exploring sound and haptic rendering, because these sensory channels certainly play a great role in crowd behaviours. The effect of these modalities on the quality of immersion will be explored.
- 3) We will evaluate the usage of the designed VR platform for two applications: a) research studies to extend knowledge on crowd behaviors, and b) training for public authorities in order to form them to study the management of crisis scenarios.

## Candidate

We are seeking extremely motivated candidates, with strong technical and scientific background. The following skills are appreciated:

- excellent developer (C++)
- knowledge in computer / human animation techniques, or in virtual reality
- interest in human behavior studies and experimental science

## Application

We are looking for motivated candidates, please send CV, a motivation letter, reference letters, and any relevant material directly to: [ludovic.hoyet@inria.fr](mailto:ludovic.hoyet@inria.fr), [anne-helene.olivier@inria.fr](mailto:anne-helene.olivier@inria.fr) and [julien.pettre@inria.fr](mailto:julien.pettre@inria.fr)

## Keywords and References

Virtual Reality, Crowd Behaviours, Immersion, Character Animation, User Experiments

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